

Patent Claims

1. Process for the production of spherical SiO₂ particles by hydrolytic polycondensation of tetraalkoxysilanes and/or organotrialkoxysilanes, characterised in that the hydrolytic polycondensation is carried out in a medium comprising water, one or more solubilisers and one or more amines.
2. Process according to Claim 1, characterised in that a sol of primary particles is firstly produced, and the resultant SiO₂ particles are subsequently brought to the desired particle size in such a way that further nucleation is prevented by continuous metered addition of corresponding silane controlled to the extent of reaction.
3. Process according to Claim 1 or 2, characterised in that the amine is selected from the group consisting of primary, secondary and tertiary organic amines.
4. Process according to Claim 1, characterised in that the amine is an alkanolamine, diamine, polyamine and/or primary alkylamine.
5. Process according to Claim 4, characterised in that the amine is aminoethanol, ethylenediamine, octylamine or diethylenetriamine.
6. Process according to one of Claims 1 to 5, characterised in that the proportion of the amine in the medium is from 0.1 to 5% by weight, preferably from 0.5 to 2% by weight.
7. Process according to one of Claims 1 to 6, characterised in that the one or more solubilisers are selected from the group consisting of alcohols,

ketones, dialkyl sulfoxides, pyrrolidones, alkyl nitriles, furans and/or dioxanes.

- 5 8. Process according to one of Claims 1 to 7, characterised in that the alkoxy group of the tetraalkoxysilane is a methoxy, ethoxy, propoxy, butoxy or pentoxy group, preferably an ethoxy group.
- 10 9. Process according to one of Claims 1 to 8, characterised in that the hydrolytic polycondensation is carried out at temperatures between 25 and 78°C, preferably between 30 and 75°C and in particular between 40 and 55°C.
- 15 10. Process according to one of Claims 1 to 9, characterised in that one or more dyes are additionally added during the hydrolytic polycondensation.
11. Process according to Claim 10, characterised in that the dye is a fluorescent dye.
- 20 12. Process according to one of Claims 10 and 11, characterised in that the dye is a terminally silylated (fluorescent) dye of the general formula $R^1R^2R^3SiR^4$, in which R^1 , R^2 and R^3 are identical or different and stand for halogen atoms, alkyl, aryl, alkoxy or silyloxy groups, and R^4 has the complex structure $A^1-B_m-C_n-A^2$, in which m and n can adopt the values zero and 1, A^1 denotes an alkyl chain or a heteroanalogous structure, preferably having from 1 to 30 chain members, B stands for a functional sequence, C denotes a bifunctional organic sequence having a chain or ring structure which is linked to A^2 in a suitable manner and in which A^2 stands for a fluorophoric system or a dye molecule which structurally offers the possibility of bonding to C or, if n is equal to zero, to B or, if m and n are equal to zero, to A^1 .
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13. Process according to Claim 12, characterised in that the functional sequence B in R^4 stands for carbonyl, oxycarbonyl, aminocarbonyl or aminothiocabonyl groups or a hetero atom, for example oxygen, nitrogen or sulfur.
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14. Process according to Claims 12 and 13, characterised in that the bifunctional sequence C in R^4 preferably stands for an alkylene unit or for substituted and heteroanalogous alkylene groups which are linked to A^2 via a carbon, nitrogen, oxygen or sulfur atom, for example as an ester or amide.
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15. Process according to one of Claims 12 to 14, characterised in that the bifunctional sequence C in R^4 stands for structural elements of hydroxy- or aminocarboxylic acids and esters or amides thereof.
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16. Process according to one of Claims 12 to 15, characterised in that the alkoxy group is a methoxy, ethoxy, propoxy, butoxy or pentoxy group, preferably an ethoxy group.
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17. Powder consisting of spherical SiO_2 particles obtainable by one of the processes according to Claims 1 to 16.
18. Powder according to Claim 17, characterised in that the SiO_2 particles have a mean particle diameter of between 0.05 and 10 μm .
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19. Use of powders consisting of SiO_2 particles, produced according to Claim 1, as sorption material in chromatography, for the isolation and purification of nucleic acids and proteins, in phagocytosis analyses, as constituents in diagnostic arrays, as solid phases for the investigation of molecular recognition phenomena and in heterogeneously catalysed processes, as component of photonic crystals and as lubricants and/or polishing agents.
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